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**WO 2004/022982 A2**

(54) Title: HEAT TRANSMITTING FLUID AND ITS RESPECTIVE OBTAINING PROCESS

(57) Abstract: "Heat transmitting fluid and its obtaining process", has as aim a practical, innovative and functional heat transmitting fluid, applicable virtually to any equipment heat by indirect method, especially conceived for thermal oil systems applied in the food, pharmaceutical, cosmetic and chemical industries, equipment which needs heating without the use of flame or electrical resistance, in small or big size industry to which original innovative functional disposition has been given, being different from other types of heat transmitting fluids usually found in the market, since it is composed of antioxidant based on derived phenyl and fluid based on linear paraffin, being satisfactorily applied as heat transmitting fluid in application temperatures between 10 and 275 °C, being that its specific application is of heat transmitting fluid based on hydrocarbon of extreme purity for thermal oil systems in the food, pharmaceutical, cosmetic and chemical industry.

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"HEAT TRANSMITTING FLUID AND ITS RESPECTIVE OBTAINING PROCESS", it has as objective a practical, innovating and functional heat transmitting fluid, applicable virtually to any heat equipment by indirect method, especially conceived for thermal oil systems applied in the food, pharmaceutical, cosmetic and chemical industry, equipment which needs heating without the use of flame or electrical resistance, in small or big size industry, to which innovating functional original deployment has been given, being different from other types of heat transmitting fluids usually found in the market.

10 More concretely, the referred fluid is constituted of and additives especially provided so as to conceive a heat transmitting fluid with density, viscosity and other thermal properties suitable for the function its used for.

15 There is, therefore, in the referred patent application, a heat transmitting fluid especially elaborated and developed for the obtaining of enormous practice which provides great advantages, in its manufacturing as well as in its application, since it does not require specific knowledge in addition to the already existing traditional experience in the chemical and oil by-products industry.

20 It is yet, the aim of the present application, to present a heat transmitting fluid with suitable costs for its industrial feasibility, however allied to the unit easiness and functionality requirements, offering this way, to the public an additional option in the similar market with great acceptance in the technical area, user of this product.

25 With the knowledge of technical-industrial area, the manufacturing of several products depends on steps, which involve heat to carry out the transformation of its internal molecular structure.

For that, the equipment, which performs such transformations, have heating constructive devices, which comply with the economy and safety 30 requirements of the most feasible process.

The heating devices industrially most applied are applied directly in the equipment, through electrical resistance or by burners fed with liquid or gas fuel, since it offers a larger performance and lower loss by thermal dissipation, however, it is not always possible to apply the heating by the above mentioned devices, because of dangerous situations such as the presence of highly inflammable material such as volatile and organic solvents, polymers, cellulose, paints, among others, which can get fire with the least contact with short-circuits or flame.

In these cases, the equipment is heated indirectly using water steam or heat transmitting oils, which are heat by means of suitable boilers, being the hot liquid sent through piping provided with thermal insulation up to the mentioned industrial equipment, which is heat by means of hot fluid circulation within coils displaced around or within the contact device with the product to be transformed, being that the fluid, after transmitting heat, returns to the boiler to be heat and reused.

These heat devices are useful in the industrial process point of view to what it is destined to, however, they have some drawbacks in the safety and maintenance point of view.

The heating by means of water steam has the inconvenient when the water condensation takes place in the water transport ducts forcing the users to use this kind of heating to install purge system along the whole steam line, to extract such condensed water. The presence of condensed water in the piping provokes the formation of internal cavitation, causing the piping undesirable vibration, in addition that the water accumulated in the piping also favors the formation of corrosion products exposing the system to serious risks of clogging, degradation of tubular installations and consequent explosions.

In the event of using heat transmitting oils, there is the toxic inconvenient, since most of the fluids used in these indirect heating systems are toxic.

Another important fact to be pointed out is that the systems which use these transmitting fluids usually are subject to leakage, exposing the fluid to the industrial environment, contaminating the operational which is in constant contact with them, or by direct contact or by steam aspirations. The danger caused by these heat transmitting oils is known in the scientific area, which has studies which define the "biphenyl" component, used in most of thermal oil available in the world market, as being carcinogenic and harmful to the central nervous system, therefore extremely harmful to operators and products subject to contamination, 10 when being manufactured.

Therefore, owing to these facts and from the development which has occurred in the last decades in the organic composed science, allied to the worry of process optimization, the present "HEAT TRANSMITTING FLUID AND ITS RESPECTIVE OBTAINING PROCESS" has been 15 developed, being better presented in two topics, as follows:

#### HEAT TRANSMITTING FLUID COMPOSITION

The heat transmitting fluid composition, expressed in percentage (%), in weight, in relation to the product total weight is the following:

- Anti-oxidant, preferentially derived phenyl or equivalent, being added in the fluid between 0,1 and 0,5%, in mass;
- Basic fluid, preferentially paraffin with C-14-C17, being added in the fluid between 99,5 and 99,9%, in mass;

#### HEAT TRANSMITTING FLUID MANUFACTURING PROCESS.

The process or, more specifically, the procedure for the obtaining of 25 heat transmitting fluid consists of the following steps:

- 1) Weighing of reagents used in the heat transmitting fluid preparation, using a duly gauged scale;
- 2) Homogenization of paraffin with the help of suitable mechanical shakers for low viscosity, preferentially with medium speed and enough 30 capacity to contain all reagents to be used for the manufacturing of fluid

and provided with heating system for work between room temperature and up to 70°C, during the homogenization;

3) Addition of antioxidant in the container mentioned in item 2, under continuous shaking;

5 4) Mixture and homogenization after the addition of antioxidant, being the mixing time defined according to the practice, until an homogeneous mixture is obtained. After the mixture, the heat transmitting fluid is placed in suitable containers.

Thus, it should be understood that the referred product is extremely  
10 simple in its formulation, showing, therefore, easy feasibility and supplying excellent practical and functional results on the known heat transmitting fluids.

The heat transmitting fluid now proposed can be used in application temperatures between -40 and 275°C, being that its specific application  
15 is of heat transmitting fluid based on hydrocarbon of extreme purity, for thermal oil systems in the food, pharmaceutical, cosmetic and chemical industry.

In addition to that, being its base of linear paraffin, it has properties such as: cinematic viscosity of 2,7 mm<sup>2</sup>/s at 40°C according to DIN  
20 51562, thermal dilation coefficient around 0,009/°K, steam pressure at 150 °C around 0,1 mbar and Conradson Charcoal waste around 0,01 % in weight.

Such transmitting fluid is considered non-toxic and complies with the requirements of legal departments on the subject, in addition to  
25 referring to a thermal transmitting fluid with superior transmitting capacity, also granting protection against corrosion and excellent stability at high and low temperatures, being suitable to be used in closed circuits, being that with specific characteristics, as mentioned above, they allow a safe operation of thermal oil systems, usually, subject to leakages in its  
30 connections, flanges and rotating joints, situations in which an operator's

contact or even the contact of food, pharmaceutical or cosmetic products under production process is inevitable.

The fluid, when in the presence of inert gas allows significant increase of its operation period, not presenting any incompatibility with

- 5 heating and cooling materials usually used, such as steel, cast iron and stainless steel, and it neither changes its color nor reduces the service time when using copper, brass, bronze or aluminum.

It can this way be verified through what has been previously said that the "HEAT TRANSMITTING FLUID AND ITS RESPECTIVE

- 10 OBTAINING PROCESS" now referred, is characterized as a product of great use, presenting all practical and functional qualities which fully justify the Invention Privilege application, since it plays the proposed role of non-toxic heat transmitting fluid, to be used as thermal oil in the food, pharmaceutical, cosmetic and chemical industry.

- 15 The product is also highlighted by the versatility of its industrial scale manufacturing, from the raw-materials mixture.

While the present application was illustrated and described regarding the above intended modality, it will be apparent to those

- 20 acquainted with that technique that other Modifications in the process composition and details can be done here without moving away from spirit and scope of what has been applied, as it is well defined in the enclosed claim.

## CLAIMS

1. "HEAT TRANSMITTING FLUID AND ITS RESPECTIVE OBTAINING PROCESS" characterized by the heat transmitting fluid composition, express in percentage (%), in weight, in relation to the product total weight, being done as follows: - Antioxidant, preferentially derived phenyl or equivalent, being added in the fluid between 0,1 and 0,5%, in mass – basic fluid, preferentially C-14-C17 linear paraffin our equivalent, being added in the fluid between 99,5 and 99,9%, in mass.
2. "HEAT TRANSMITTING FLUID AND ITS RESPECTIVE OBTAINING PROCESS" characterized by the procedure for the obtaining of heat transmitting fluid consist of the following phases: weighing of reagents used in the heat transmitting fluid preparation, using a suitable gauged scale; 2 homogenization of linear paraffin with the help of mechanical shakers suitable for low viscosity, preferentially with medium speed and constructively suitable to operate with synthetic hydrocarbon with extreme purity, enough capacity to contain all reagents to be used for the manufacturing of fluid and provided with heating system for work between room temperature and up to 70°C, during the homogenization; 3) addition of antioxidant in the container mentioned in item 2, under continuous shaking; 4) mixture and homogenization after the addition of antioxidant, being the mixing time defined according to the practice, until an homogeneous mixture is obtained, being that after the mixture, the heat transmitting fluid is placed in usual packing, preferentially metal ones.

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Published:

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**INTERNATIONAL SEARCH REPORT**

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PCT/BR03/00098

**A. CLASSIFICATION OF SUBJECT MATTER**

IPC(7) : C09K 7/00  
US CL : 252/71,73,75,76; 585/323; 508/234

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)  
U.S. : 252/71,73,75,76; 585/323; 508/234

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched  
NONE

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)  
WEST: LUBRICANTS, PHENYL, LINEAR, PARAFFIN

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 3909,432 A (MCGUIRE et al) 30 September 1975 (30.09.1975), see entire document	1-2
A	US 5,094,765 (DEROSA et al) 10 March 1992 (10.03.1992), see entire document.	1-2
A	US 5,332,516 A (STEPHENS) 26 July 1994 (26.07.1994), see entire document	1-2

Further documents are listed in the continuation of Box C.

See patent family annex.

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